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PROBLEMS IN PROVIDING
MINERALS FOR AN
EXPANDING POPULATION

HUBERT E. RISSER

ILLINOIS STATE GEOLOGICAL SURVEY

JOHN C. FRYE, Chief · Urbana

PROBLEMS IN PROVIDING MINERALS

FOR AN EXPANDING POPULATION

Hubert E. Risser

INTRODUCTION

Those who are connected with the mineral industries have watched with growing concern the relentless spread of urbanization and its effect on these industries. Not only have the cities spread out to envelop existing mineral operations and cover unworked mineral deposits, but their power and authority is extended into the areas beyond the city, and in many locations mineral production is prohibited there also.

One of the most difficult things for the mineral industry to understand has been the apparent lack of realization on the part of the public that not only was the mineral industry being hurt but that the public was depriving itself, perhaps forever, of the very materials needed for continued expansion and construction.

Like most other people concerned with mineral resources, we at the Illinois State Geological Survey have been disturbed for a long time by the problems arising from urban sprawl. We have no final answers to these problems, but we are attempting wherever possible to assist in their solution. We have of course for many years assisted the industry by providing geological information to aid in the search for new sites to replace those exhausted through normal operations or displaced for other reasons.

PROBLEMS OF MINERAL AVAILABILITY

Within the past two decades the American public, which had long been accustomed to considering its resources as almost limitless, has become increasingly aware that they are, in fact, exhaustible.

Perhaps the first major step in the general awakening was the report of the President's Materials Policy Commission, known as the Paley Report, published in 1952. The authors of this report attempted to assess our resource position and project future demand and availability. That some of these predictions strayed rather widely from what actually occurred in the ensuing years is of little importance at the present time. What is important is

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that the report focused public attention on the vitally significant fact that not only has the demand for minerals been growing at an unprecedented rate, but that each unit of production exerts pressure on a diminishing resource base.

Much has been said and written about the "population explosion," and its influence on almost every facet of living. This population increase has resulted in both direct and indirect effects in the case of minerals. The most obvious direct effect is the need that has arisen for greatly increased quantities of materials with which to build the homes, factories, machines, highways, and other facilities to satisfy the wants of the growing population. An indirect and less obvious effect occurs when the construction of these facilities covers land containing other mineral resources, thus making them unavailable for any future use, perhaps forever. In addition, zoning ordinances in and around the metropolitan areas have restricted or prohibited the exploitation of many of the other deposits that do remain accessible.

A few examples help to illustrate the various ways in which minerals are being made inaccessible for use.

In Illinois in 1960, the last year in which a full census was reported, 76.9 percent of the population of the state of Illinois resided in the eight regions classified by the Bureau of Census as Standard Metropolitan Statistical Areas. During 1960 the 15 Illinois counties included in these areas produced 59.0 percent of the stone and 72 percent of the sand and gravel produced in the state, although they encompassed only 17.5 percent of the area of the state. Therefore, in the regions of greatest demand the withdrawal of resources was 13 times as great per unit area as for the rest of the state. Added to this are the resources blanketed by the sprawling metropolis each year.

I have no figures to estimate accurately the actual area affected by urban expansion each year, but it is obvious that within very short periods of time large new areas have become completely and solidly urbanized. It has been estimated that city streets in Illinois are being increased at the rate of 175 miles per year. In the Chicago area alone, according to estimates, 25 square miles of area is being covered each year by urbanization. Perhaps the ultimate example of concentration is Los Angeles County, California, where 65 percent of the total land area is reported to be covered by automobile transport facilities in the form of expressways, highways, streets, and parking lots.

While urban areas may feel most acutely and directly the pressure of population, its effects are not by any means restricted to these areas. Expanded highway systems, airfields, reservoirs, recreational facilities, and other developments are likewise an outgrowth of population pressure.

The 41,000-mile interstate highway system, 1585 miles of it in Illinois, provides an example. At a standard right-of-way width of 300 feet, each mile of highway withdraws from other use 36.3 acres. Each interchange covers 45 to 50 acres. In Illinois, where roughly two-thirds of the state is underlain by coal beds averaging perhaps 4 feet thick, the tonnages of coal reserves affected by the interstate highways alone amounts to hundreds of millions of tons.

A bit aside from mineral problems, but nevertheless in the same vein, is the effect of expansion on agriculture. It has been estimated that 1½ million acres of agricultural land is lost annually to highways, airports, industrial developments, urbanization, and the like. If the population increases to 360 million by the year 2000, as has sometimes been predicted, and the withdrawal of agricultural land continues at its present rate, the land available, per capita, for agricultural purposes will be reduced by more than one-half by the end of this century. At the same time, much of the mineral wealth lying beneath these lands also will be rendered inaccessible.

MINERAL RESOURCES IN ILLINOIS PLANNING ACTIVITIES

The current problems and future implications of the burgeoning population are becoming increasingly a matter of concern to both private and public groups. Planning has become the watchword, and planning agencies on the local, county, intercounty, state, and interstate levels have been established. One of the major aims of these agencies is to allocate the space and the resources available within an area or region to the highest possible use or uses and to resolve possible conflicts among these uses. While such decisions are largely a matter of judgment, not all agencies are of equal competence and it is to be hoped that they will avail themselves of all existing sources of assistance.

Numerous agencies and groups are involved in planning within Illinois. State-wide planning in Illinois is the responsibility of the Board of Economic Development of the state. This Board is also the coordinating unit for planning functions in Illinois involving federal or other state agencies. In carrying out these responsibilities it relies upon other Illinois agencies and the state universities for technical and other information. The State Geological Survey, as the state agency responsible for research on the occurrence, availability, and utilization of the mineral resources, serves as the technical advisory agency in this particular field. Some of the ways in which the Geological Survey participates are mentioned in the following discussion.

Northeastern Illinois Planning Commission

In Illinois one of the oldest, most active, and most effective agencies has been the Northeastern Illinois Planning Commission, formerly known as the Northeastern Illinois Metropolitan Area Planning Commission. The Illinois State Geological Survey established a field office in that area a number of years ago and has worked closely with the Planning Commission from its beginning. A report of some of these activities appears in Environmental Geology Notes No. 3.

State-Wide Comprehensive Plan

The Board of Economic Development is engaged in the development of a comprehensive state-wide plan that will involve a study of the numerous facets of the state's economy and potential. Survey staff members are preparing the sections of the study dealing with ground-water occurrence, and the occurrence,

production, and processing of minerals in Illinois. For this purpose the state has been divided into eight regions, each of which will be treated fully.

Technical Advisory Committee on Water Resources

The Geological Survey, along with the State Water Survey, Division of Waterways, Division of Sanitation, Department of Agriculture, and other state agencies, is represented on the Technical Advisory Committee of the state. This advisory committee to the governor considers the state's role in all problems concerning water.

Wabash Valley Commission

The Wabash Valley Commission is a bi-state commission formed by Illinois and Indiana to study the problems of flood control, resources, water, and industrial development within the Wabash Basin. The Geological Survey serves in an advisory capacity, furnishing technical information on mineral resources.

U. S. Corps of Engineers River Control Work

River basin activities of the U. S. Corps of Engineers are concerned primarily with flood control and water resources. However, to evaluate each dam project properly for establishing cost-benefit ratios requires consideration of loss of both current and potential mineral production. In Illinois, the State Geological Survey provides technical data regarding the resources occurring in the area of reservoir sites under consideration.

Upper Mississippi River Basin Comprehensive Plan

The Corps of Engineers in developing comprehensive river basin plans establishes numerous advisory committees to cover various aspects of water usage. One important consumer of water is the electric power producing industry which, in the Middle West, uses coal as its primary fuel. A member of the Survey staff is on the Power Subcommittee responsible for analyzing future fuel needs and availability.

Water Resources Center

Most of the states of the nation have come to realize in recent years that however adequate their water resources may currently appear, their supplies are likely in a few years to become inadequate both in quantity and quality, if population and industrial growth continue at their present rate. In recognition of this, a Water Resources Center was established at the University of Illinois during the past year to emphasize training of water scientists and engage in research on water problems in the state. The Chief of the Geological Survey is a member of the Executive Committee of the Center.

U. S. Office of Emergency Planning

Members of the staff of the Geological Survey serve on task force groups of the U. S. Office of Emergency Planning. As members of the Solid Fuels Task Force and Liquid Fuels Task Force, they contribute their knowledge of the producing industries and the utilization of these fuels to assist in the formulation of the plans.

Industrial Development Groups

Members of the staff of the Geological Survey, especially in the Mineral Economics Group, maintain close liaison with organizations and individuals concerned with industrial development. Here the object is to provide, wherever needed, information on the availability and use of resources for the expansion of industrial and commercial activities.

Governor's Science Advisory Council

Recently, the governor of the state of Illinois appointed a Science Advisory Council to advise the administration on establishing and maintaining in Illinois a climate favorable to science-oriented activities. On this council are prominent scientists from all the major fields, including the Chiefs of the State Geological Survey, Natural History Survey, and Water Survey.

While some of the organizations and activities described above may seem only remotely connected with urbanization and mineral resources, they have one thing in common. Mineral resources and the mineral industries are considered an integral part of their problems—otherwise the Geological Survey would not be included in their membership.

The Illinois Geological Survey is not a policy-making agency. It is not a promotional agency, nor is it a regulatory agency. It is a scientific and research organization devoted to acquiring and disseminating information regarding the mineral resources and geology of the state and their present and potential utilization.

Out of our activities with the various agencies named above and their problems has come what we believe to be a new concept. We call it environmental geology—the application of geologic knowledge and data to the improvement of the human environment.

Taking part in these activities brings to the Survey the opportunity for interesting and challenging work beyond the more or less routine studies and provision of information requested. Within recent months we were approached by one of the major planning agencies with a request that we direct and assist in a study to determine, if possible, just what the measurable economic effects of the encroachment of the metropolitan area on the relatively limited mineral resources of the area have been. This promises to be an extremely interesting, if difficult, project and will open the way, we believe, to important contributions to the field later on.

By participation in these activities we feel that we can serve a number of useful functions. First, we can supply necessary data requested. Second, we can point out facts and problems that might otherwise be overlooked, and may be able to offer suggestions for approaches to these problems. Third, we can perhaps, to some degree, call attention to potential future problems so that they can be avoided by taking proper action.

It is certain that to meet the future challenge and demands of our population the combined efforts of everyone will be required.

ENVIRONMENTAL GEOLOGY NOTES SERIES

1. Controlled Drilling Program in Northeastern Illinois: J. E. Hackett and G. M. Hughes. April 1965.
2. Data From Controlled Drilling Program in DuPage County, Illinois: Jean I. Larsen and C. R. Lund. May 1965.
3. Activities in Environmental Geology in Northeastern Illinois: Jean I. Larsen and J. E. Hackett. June 1965.
4. Geological and Geophysical Investigations for a Ground-Water Supply at Macomb, Illinois: Keros Cartwright and D. A. Stephenson. July 1965.

